

WHAT IS CLAIMED:

1. An organic light-emitting device, comprising:
 - a) a substrate;
 - b) an anode and a cathode disposed over the substrate;
 - c) a luminescent layer disposed between the anode and the cathode wherein the luminescent layer includes a host and at least one dopant;
 - d) the host of the luminescent layer being selected to include a solid organic material comprising a mixture of at least two components wherein:
 - i) the first component of the mixture is an organic compound that is capable of transporting either electrons or holes or both and is capable of forming both monomer state and an aggregate state and further is capable of forming the aggregate state either in the ground electronic state or in the excited electronic state that results in a different absorption or emission spectrum or both relative to the absorption or emission spectrum or both of the monomer state, respectively, or the first component of the mixture is capable of forming the aggregate state whose presence results in a quantum yield of luminescence of the monomer state being different relative to the quantum yield of luminescence of the monomer state in the absence of the aggregate state, and
 - ii) the second component of the mixture is an organic compound that upon mixing with the first host component is capable of forming a continuous and substantially pin-hole-free layer; and
 - e) the dopant of the luminescent layer being selected to produce light from the light-emitting device.
2. The organic light-emitting device of claim 1 wherein the aggregate state is a dimer in either ground electronic state or excited electronic state.

3. The organic light-emitting device of claim 1 wherein the aggregate state is crystalline.
4. The organic light-emitting device of claim 3 wherein the aggregate state is a microcrystalline or nanocrystalline domain.
5. The organic light-emitting device of claim 1 wherein the first component is an organic compound that is nonpolar.
6. The organic light-emitting device of claim 1 wherein the first component is an organic compound that includes a benzenoid hydrocarbon.
7. The organic light-emitting device of claim 1 wherein the first component is an organic compound that includes a heterocycle.
8. The organic light-emitting device of claim 1 wherein the second component is an organic compound that is more polar than the first component.
9. The organic light-emitting device of claim 1 wherein the first component is an organic compound having an energy gap greater than 1.5 electron volts.
10. The organic light-emitting device of claim 1 wherein the second component is an organic compound having an energy gap greater than 1.5 electron volts.
11. The organic light-emitting device of claim 1 wherein the first component constitutes at least 1 volume % of the luminescent layer.

12. The organic light-emitting device of claim 1 wherein the second component constitutes at least 1 volume % of the luminescent layer.

13. The organic light-emitting device of claim 1 wherein the dopant has an energy gap less than or equal to those of the first component and the second component.

14. The organic light-emitting device of claim 1 wherein the dopant is a fluorescent dye.

15. The organic light-emitting device of claim 1 wherein the dopant is a phosphorescent dye.

16. The organic light-emitting device of claim 1 wherein the dopant concentration in the luminescent layer is between 0 and 10% by volume.

17. The organic light-emitting device of claim 1 wherein the first component is pyrene or a derivative thereof.

18. The organic light-emitting device of claim 1 wherein the first component is a benzopyrene or a derivative thereof.

19. The organic light-emitting device of claim 1 wherein the first component is a naphthopyrene or a derivative thereof.

20. The organic light-emitting device of claim 1 wherein the first component is naphthacene or a derivative thereof.

21. The organic light-emitting device of claim 1 wherein the first component is pentacene or a derivative thereof.

22. The organic light-emitting device of claim 1 wherein the first component is perylene or a derivative thereof.

23. The organic light-emitting device of claim 1 wherein the first component is fluoranthene or a derivative thereof.

24. The organic light-emitting device of claim 1 wherein the first component is anthracene or a derivative thereof.

25. The organic light-emitting device of claim 1 wherein the first component is anthanthrene or a derivative thereof.

26. The organic light-emitting device of claim 1 wherein the first component is benzo[ghi]perylene or a derivative thereof.

27. The organic light-emitting device of claim 1 wherein the first component is coronene or a derivative thereof.

28. The organic light-emitting device of claim 1 wherein the first component is dibenzo[cd,lm]perylene (peropyrene) or a derivative thereof.

29. The organic light-emitting device of claim 1 wherein the first component is rubicene or a derivative thereof.

30. The organic light-emitting device of claim 1 wherein the first component is chrysene or a derivative thereof.

31. The organic light-emitting device of claim 1 wherein the first component is phenanthrene or a derivative thereof.

32. The organic light-emitting device of claim 1 wherein the first component is pyranthrene or a derivative thereof.

33. The organic light-emitting device of claim 1 wherein the first component is a dibenzopyrene or a derivative thereof.

34. The organic light-emitting device of claim 1 wherein the first component is benzoperylene or a derivative thereof.

35. The organic light-emitting device of claim 1 wherein the first component is a dibenzoperylene or a derivative thereof.

36. The organic light-emitting device of claim 1 wherein the first component is tetraphene or a derivative thereof.

37. The organic light-emitting device of claim 1 wherein the first component is pentaphene or a derivative thereof.

38. The organic light-emitting device of claim 1 wherein the first component is hexaphene or a derivative thereof.

39. The organic light-emitting device of claim 1 wherein the first component is hexacene or a derivative thereof.

40. The organic light-emitting device of claim 1 wherein the first component is triphenylene or a derivative thereof.

41. The organic light-emitting device of claim 1 wherein the first component is a benzotriphenylene or a derivative thereof.

42. The organic light-emitting device of claim 1 wherein the first component is benzo[a]coronene or dibenzocoronene or tribenzocoronene or tetrabenzocoronene or pentabenzocoronene or hexabenzocoronene or a derivative thereof.

43. The organic light-emitting device of claim 1 wherein the first component is picene or a derivative thereof.

44. The organic light-emitting device of claim 1 wherein the first component is fluorene or a derivative thereof.

45. The organic light-emitting device of claim 1 wherein the first component is a naphthoperylene or dinaphthoperylene or a derivative thereof.

46. The organic light-emitting device of claim 1 wherein the first component is a PAH compound that can be drawn using only fully aromatic benzene rings so as to form graphite-like segments or a derivative thereof.

47. The organic light-emitting device of claim 1 wherein the first component includes a benzenoid hydrocarbon or a derivative thereof substituted with a donor or an acceptor moiety or both.

48. The organic light-emitting device of claim 1 wherein the second component includes a benzenoid hydrocarbon or a derivative thereof substituted with a donor or an acceptor moiety or both.

49. The organic light-emitting device of claim 1 wherein the second component includes an oxinoid compound.

50. The organic light-emitting device of claim 49 wherein the second component includes AlQ_3 , GaQ_3 , InQ_3 , ScQ_3 , ZnQ_2 , BeBq_2 (bis(10-hydroxybenzo[*h*]quinolinato)beryllium), $\text{Al}(4\text{-MeQ})_3$, $\text{Al}(2\text{-MeQ})_3$, $\text{Al}(2,4\text{-Me}_2\text{Q})_3$, $\text{Ga}(4\text{-MeQ})_3$, $\text{Ga}(2\text{-MeQ})_3$, $\text{Ga}(2,4\text{-Me}_2\text{Q})_3$, $\text{Mg}(2\text{-MeQ})_2$, or $\text{Al}(2\text{-MeQ})_2(\text{X})$ where X is any aryloxy, alkoxy, arylcarboxylate, and heterocyclic carboxylate group.

51. The organic light-emitting device of claim 1 wherein the second component includes an anthracene moiety.

52. The organic light-emitting device of claim 51 wherein the second component includes:

2-(1,1-dimethylethyl)-9,10-bis(2-naphthalenyl)anthracene (TBADN),

9,10-bis(2-naphthalenyl)anthracene (ADN),

9,10-bis(1-naphthalenyl)anthracene,

9,10-Bis[4-(2,2-diphenylethenyl)phenyl]anthracene,

9,10-Bis([1,1':3',1''-terphenyl]-5'-yl)anthracene,

9,9'-Bianthracene,

10,10'-Diphenyl-9,9'-bianthracene,

10,10'-Bis([1,1':3',1''-terphenyl]-5'-yl)-9,9'-bianthracene,

2,2'-Bianthracene,

9,9',10,10'-Tetraphenyl-2,2'-bianthracene,

9,10-Bis(2-phenylethenyl)anthracene, or

9-Phenyl-10-(phenylethynyl)anthracene.

53. The organic light-emitting device of claim 1 wherein the second component includes an amine moiety.

54. The organic light-emitting device of claim 53 wherein the second component includes:

N,N'-bis(1-naphthalenyl)-N,N'-diphenylbenzidine (NPB),
N,N'-bis(1-naphthalenyl)-N,N'-bis(2-naphthalenyl)benzidine (TNB),
N,N'-bis(3-methylphenyl)-N,N'-diphenylbenzidine (TPD), or
N,N'-Bis(N'',N''-diphenylaminonaphthalen-5-yl)-N,N'-diphenyl-1,5-diaminonaphthalene (CAS 503624-47-3).

55. The organic light-emitting device of claim 1 wherein the second component includes a fluorene moiety.

56. The organic light-emitting device of claim 55 wherein the second component includes:

2,2',7,7'-Tetraphenyl-9,9'-spirobi[9H-fluorene],
2,2',7,7'-Tetra-2-phenanthrenyl-9,9'-spirobi[9H-fluorene],
2,2'-Bis(4-N,N-diphenylaminophenyl)-9,9'-spirobi[9H-fluorene] (CAS 503307-40-2),
4'-Phenyl-spiro[fluorene-9,6'-[6H]indeno[1,2-j]fluoranthene],
2,3,4-Triphenyl-9,9'-spirobi[fluorene],
11,11'-Spirobi[11H-benzo[b]fluorene],
9,9'-Spirobi[9H-fluorene]-2,2'-diamine,
9,9'-Spirobi[9H-fluorene]-2,2'-dicyanitrile,
2',7'-Bis([1,1'-biphenyl]-4-yl)-N,N,N',N'-tetraphenyl-9,9'-spirobi[9H-fluorene]-2,7-diamine,
9,9,9',9',9'',9''-Hexaphenyl-2,2':7',2''-ter-9H-fluorene,
2,7-Bis([1,1'-biphenyl]-4-yl)-9,9'-spirobi[9H-fluorene],
2,2',7,7'-tetra-2-Naphthalenyl-9,9'-spirobi[9H-fluorene], or
9,9'-[(2,7-Diphenyl-9H-fluorene-9-ylidene)di-4,1-phenylene]bis-anthracene.

57. The organic light-emitting device of claim 1 wherein the second component includes a naphthacene moiety.

58. The organic light-emitting device of claim 57 wherein the second component includes:

5,6,11,12-Tetraphenylnaphthacene (rubrene),
5,12-Bis(2-naphthyl)-6,11-diphenyltetracene,
5,12-Bis(2-mesityl)-6,11-diphenyltetracene,
5,12-Bis(1-naphthyl)-6,11-diphenyltetracene,
5,6,11,12-Tetrakis(2-naphthyl)tetracene,
10,10'-[(6,11-Diphenyl-5,12-naphthacenediyl)di-4,1-phenylene]bis[2,3,6,7-tetrahydro-1H,5H-benzothiazolo[5,6,7-ij]quinolizine,
9,10,15,16-Tetraphenyl-dibenzo[a,c]naphthacene,
5,6,13,14-Tetraphenylpentacene,
4,4'-(8,9-Dimethyl-5,6,7,10,11,12-hexaphenyl-1,4-naphthacenediyl)bis-benzonitrile,
4,4'-(8,9-Dimethoxy-5,6,7,10,11,12-hexaphenyl-1,4-naphthacenediyl)bis[N,N-diphenylbenzenamine],
1,2,3,5,6,11,12-Heptaphenylnaphthacene,
1,4,5,6,7,10,11,12-Octaphenylnaphthacene,
6,11-diphenyl-5,12-bis(4'-N,N-diphenylaminophenyl)naphthacene,
7,8,15,16-Tetraphenyl-benzo[a]pentacene,
2,3,5,6,11,12-Hexaphenylnaphthacene,
6,11-diphenyl-5,12-bis(4'-cyanophenyl)naphthacene,
6,11-diphenyl-5,12-bis(4'-(2-thienyl)phenyl)naphthacene, or
9,10,19,20-Tetraphenyl-tetrabenzo[a,c,j,l]naphthacene.

59. The organic light-emitting device of claim 1 wherein the second component includes a benzoxazolyl moiety or thio and amino analogs of benzoxazolyl moiety.

60. The organic light-emitting device of claim 1 wherein the dopant includes a DCM moiety.

61. The organic light-emitting device of claim 60 wherein the dopant includes: DCM, DCJ, DCJT, DCJTE, DCJTP, DCJTBz, DCJTB, or DCJTMes.

62. The organic light-emitting device of claim 1 wherein the dopant includes a periflanthene moiety.

63. The organic light-emitting device of claim 62 wherein the dopant includes Red 2.

64. The organic light-emitting device of claim 1 wherein the dopant includes a coumarin moiety:

65. The organic light-emitting device of claim 64 wherein the dopant includes C-6, C-545T, or C-525T.

66. The organic light-emitting device of claim 1 wherein the dopant includes a quinacridone moiety.

67. The organic light-emitting device of claim 66 wherein the dopant includes QA, DMQA, CFDMQA, or DPQA.

68. The organic light-emitting device of claim 1 wherein the dopant includes a DPMB moiety.

69. The organic light-emitting device of claim 68 wherein the dopant includes DPMB 1, DPMB 2, or DPMB 3.

70. The organic light-emitting device of claim 1 wherein the dopant includes an indenoperylene moiety.

71. The organic light-emitting device of claim 70 wherein the dopant includes Yellow-green 2.

72. The organic light-emitting device of claim 1 wherein the dopant includes a naphthacene moiety.

73. The organic light-emitting device of claim 72 wherein the dopant includes:

5,6,11,12-Tetraphenylnaphthacene (rubrene),
2,2'-[(6,11-diphenyl-5,12-naphthacenediyl)di-4,1-phenylene]bis(6-methylbenzothiazole) (Orange 2),
5,12-Bis(2-mesityl)-6,11-diphenyltetracene,
5,6,11,12-Tetrakis(2-naphthyl)tetracene,
10,10'-[(6,11-Diphenyl-5,12-naphthacenediyl)di-4,1-phenylene]bis[2,3,6,7-tetrahydro-1H,5H-benzothiazolo[5,6,7-ij]quinolizine,
5,6,13,14-Tetraphenylpentacene,
4,4'-(8,9-Dimethoxy-5,6,7,10,11,12-hexaphenyl-1,4-naphthacenediyl)bis[N,N-diphenylbenzenamine],
6,11-diphenyl-5,12-bis(4'-N,N-diphenylaminophenyl)naphthacene,
7,8,15,16-Tetraphenyl-benzo[a]pentacene, or
6,11-diphenyl-5,12-bis(4'-cyanophenyl)naphthacene.

74. The organic light-emitting device of claim 1 wherein the dopant includes a BASB moiety.

75. The organic light-emitting device of claim 74 wherein the dopant includes:

4-(Diphenylamino)-4'-[4-(diphenylamino)styryl]stilbene,
4-(Di-p-Tolylamino)-4'-[(di-p-tolylamino)styryl]stilbene (Blue-green 2),

4,4'-[(2,5-Dimethoxy-1,4-phenylene)di-2,1-ethenediyl]bis[N,N-bis(4-methylphenyl)benzenamine],

4,4'-(1,4-Naphthalenediyl)di-2,1-ethenediyl]bis[N,N-bis(4-methylphenyl)benzenamine],

3,3'-(1,4-Phenylenedi-2,1-ethenediyl)bis[9-(4-ethylphenyl)-9H-carbazole],

4,4'-(1,4-Phenylenedi-2,1-ethenediyl)bis[N,N-diphenyl-1-naphthalenamine],

4,4'-[1,4-Phylenebis(2-phenyl-2,1-ethenediyl)]bis[N,N-diphenylbenzenamine],

4,4',4''-(1,2,4-Benzenetriyltri-2,1-ethenediyl)tris[N,N-diphenylbenzenamine],

9,10-Bis[4-(di-p-tolylamino)styryl]anthracene, or

α,α' -(1,4-Phenylenedimethyldiyl)bis[4-(diphenylamino)-1-naphthaleneacetonitrile].

76. The organic light-emitting device of claim 1 wherein the dopant includes a perylene moiety.

77. The organic light-emitting device of claim 76 wherein the dopant includes:

Perylene,

2,5,8,11-Tetra-tert-butylperylene (TBP),

2,8-Di-tert-Butylperylene,

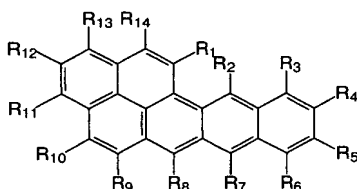
Benzo[b]perylene, or

Dibenzo[b,k]perylene.

78. The organic light-emitting device of claim 1 wherein the dopant includes a ADPMB moiety.

79. The organic light-emitting device of claim 78 wherein the dopant includes: Blue 2, ADPMB 1, or ADPMB 2.

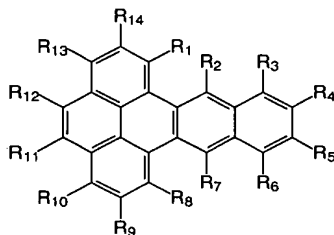
80. The organic light-emitting device of claim 1 wherein the first component of the mixture is a benzenoid compound that has the formula:



wherein:

substituents R₁ through R₁₄ are each individually hydrogen, fluoro, cyano, alkoxy, aryloxy, diarylamino, arylalkylamino, dialkylamino, trialkylsilyl, triarylsilyl, diarylalkylsilyl, dialkylarylsilyl, keto, dicyanomethyl, alkyl of from 1 to 24 carbon atoms, alkenyl of from 1 to 24 carbon atoms, alkynyl of from 1 to 24 carbon atoms, aryl of from 5 to 30 carbon atoms, substituted aryl, heterocycle containing at least one nitrogen atom, or at least one oxygen atom, or at least one sulfur atom, or at least one boron atom, or at least one phosphorus atom, or at least one silicon atom, or any combination thereof; or any two adjacent R₁ through R₁₄ substituents form an annelated benzo-, naphtho-, anthra-, phenanthro-, fluorantheno-, pyreno-, triphenyleno-, or peryleno- substituent or its alkyl or aryl substituted derivative; or any two R₁ through R₁₄ substituents form a 1,2-benzo, 1,2-naphtho, 2,3-naphtho, 1,8-naphtho, 1,2-anthraceno, 2,3-anthraceno, 2,2'-BP, 4,5-PhAn, 1,12-TriP, 1,12-Per, 9,10-PhAn, 1,9-An, 1,10-PhAn, 2,3-PhAn, 1,2-PhAn, 1,10-Pyr, 1,2-Pyr, 2,3-Per, 3,4-FlAn, 2,3-FlAn, 1,2-FlAn, 3,4-Per, 7,8-FlAn, 8,9-FlAn, 2,3-TriP, 1,2-TriP, ace, or indeno substituent or their alkyl or aryl substituted derivative.

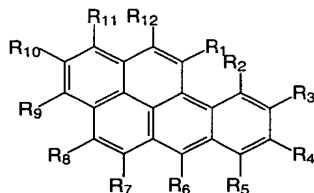
81. The organic light-emitting device of claim 1 wherein the first component of the mixture is a benzenoid compound that has the formula:



wherein:

substituents R₁ through R₁₄ are each individually hydrogen, fluoro, cyano, alkoxy, aryloxy, diarylamino, arylalkylamino, dialkylamino, trialkylsilyl, triarylsilyl, diarylalkylsilyl, dialkylarylsilyl, keto, dicyanomethyl, alkyl of from 1 to 24 carbon atoms, alkenyl of from 1 to 24 carbon atoms, alkynyl of from 1 to 24 carbon atoms, aryl of from 5 to 30 carbon atoms, substituted aryl, heterocycle containing at least one nitrogen atom, or at least one oxygen atom, or at least one sulfur atom, or at least one boron atom, or at least one phosphorus atom, or at least one silicon atom, or any combination thereof; or any two adjacent R₁ through R₁₄ substituents form an annelated benzo-, naphtho-, anthra-, phenanthro-, fluorantheno-, pyreno-, triphenyleno-, or peryleno- substituent or its alkyl or aryl substituted derivative; or any two R₁ through R₁₄ substituents form a 1,2-benzo, 1,2-naphtho, 2,3-naphtho, 1,8-naphtho, 1,2-anthraceno, 2,3-anthraceno, 2,2'-BP, 4,5-PhAn, 1,12-TriP, 1,12-Per, 9,10-PhAn, 1,9-An, 1,10-PhAn, 2,3-PhAn, 1,2-PhAn, 1,10-Pyr, 1,2-Pyr, 2,3-Per, 3,4-FlAn, 2,3-FlAn, 1,2-FlAn, 3,4-Per, 7,8-FlAn, 8,9-FlAn, 2,3-TriP, 1,2-TriP, ace, or indeno substituent or their alkyl or aryl substituted derivative.

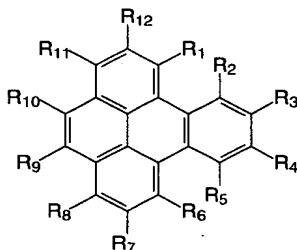
82. The organic light-emitting device of claim 1 wherein the first component of the mixture is a benzenoid compound that has the formula:



wherein:

substituents R₁ through R₁₂ are each individually hydrogen, fluoro, cyano, alkoxy, aryloxy, diarylamino, arylalkylamino, dialkylamino, trialkylsilyl, triarylsilyl, diarylalkylsilyl, dialkylarylsilyl, keto, dicyanomethyl, alkyl of from 1 to 24 carbon atoms, alkenyl of from 1 to 24 carbon atoms, alkynyl of from 1 to 24 carbon atoms, aryl of from 5 to 30 carbon atoms, substituted aryl, heterocycle containing at least one nitrogen atom, or at least one oxygen atom, or at least one sulfur atom, or at least one boron atom, or at least one phosphorus atom, or at least one silicon atom, or any combination thereof; or any two adjacent R₁ through R₁₂ substituents form an annelated benzo-, naphtho-, anthra-, phenanthro-, fluorantheno-, pyreno-, triphenyleno-, or peryleno- substituent or its alkyl or aryl substituted derivative; or any two R₁ through R₁₂ substituents form a 1,2-benzo, 1,2-naphtho, 2,3-naphtho, 1,8-naphtho, 1,2-anthraceno, 2,3-anthraceno, 2,2'-BP, 4,5-PhAn, 1,12-TriP, 1,12-Per, 9,10-PhAn, 1,9-An, 1,10-PhAn, 2,3-PhAn, 1,2-PhAn, 1,10-Pyr, 1,2-Pyr, 2,3-Per, 3,4-FlAn, 2,3-FlAn, 1,2-FlAn, 3,4-Per, 7,8-FlAn, 8,9-FlAn, 2,3-TriP, 1,2-TriP, ace, or indeno substituent or their alkyl or aryl substituted derivative.

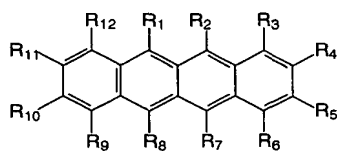
83. The organic light-emitting device of claim 1 wherein the first component of the mixture is a benzenoid compound that has the formula:



wherein:

substituents R_1 through R_{12} are each individually hydrogen, fluoro, cyano, alkoxy, aryloxy, diarylamino, arylalkylamino, dialkylamino, trialkylsilyl, triarylsilyl, diarylalkylsilyl, dialkylarylsilyl, keto, dicyanomethyl, alkyl of from 1 to 24 carbon atoms, alkenyl of from 1 to 24 carbon atoms, alkynyl of from 1 to 24 carbon atoms, aryl of from 5 to 30 carbon atoms, substituted aryl, heterocycle containing at least one nitrogen atom, or at least one oxygen atom, or at least one sulfur atom, or at least one boron atom, or at least one phosphorus atom, or at least one silicon atom, or any combination thereof; or any two adjacent R_1 through R_{12} substituents form an annelated benzo-, naphtho-, anthra-, phenanthro-, fluorantheno-, pyreno-, triphenyleno-, or peryleno- substituent or its alkyl or aryl substituted derivative; or any two R_1 through R_{12} substituents form a 1,2-benzo, 1,2-naphtho, 2,3-naphtho, 1,8-naphtho, 1,2-anthraceno, 2,3-anthraceno, 2,2'-BP, 4,5-PhAn, 1,12-TriP, 1,12-Per, 9,10-PhAn, 1,9-An, 1,10-PhAn, 2,3-PhAn, 1,2-PhAn, 1,10-Pyr, 1,2-Pyr, 2,3-Per, 3,4-FlAn, 2,3-FlAn, 1,2-FlAn, 3,4-Per, 7,8-FlAn, 8,9-FlAn, 2,3-TriP, 1,2-TriP, ace, or indeno substituent or their alkyl or aryl substituted derivative.

84. The organic light-emitting device of claim 1 wherein the first component of the mixture is a benzenoid compound that has the formula:

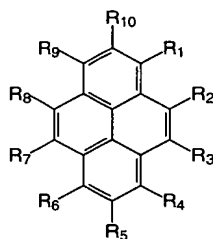


wherein:

substituents R_1 through R_{12} are each individually hydrogen, fluoro, cyano, alkoxy, aryloxy, diarylamino, arylalkylamino, dialkylamino, trialkylsilyl, triarylsilyl, diarylalkylsilyl, dialkylarylsilyl, keto, dicyanomethyl, alkyl of from 1 to 24 carbon atoms, alkenyl of from 1 to 24 carbon atoms, alkynyl of from 1 to 24 carbon atoms, aryl of from 5 to 30 carbon atoms, substituted aryl, heterocycle containing at least one nitrogen atom, or at least one oxygen atom, or at least one sulfur atom, or at least one boron atom, or at least one phosphorus atom, or at least

one silicon atom, or any combination thereof; or any two adjacent R₁ through R₁₂ substituents form an annelated benzo-, naphtho-, anthra-, phenanthro-, fluorantheno-, pyreno-, triphenyleno-, or peryleno- substituent or its alkyl or aryl substituted derivative; or any two R₁ through R₁₂ substituents form a 1,2-benzo, 1,2-naphtho, 2,3-naphtho, 1,8-naphtho, 1,2-anthraceno, 2,3-anthraceno, 2,2'-BP, 4,5-PhAn, 1,12-TriP, 1,12-Per, 9,10-PhAn, 1,9-An, 1,10-PhAn, 2,3-PhAn, 1,2-PhAn, 1,10-Pyr, 1,2-Pyr, 2,3-Per, 3,4-FlAn, 2,3-FlAn, 1,2-FlAn, 3,4-Per, 7,8-FlAn, 8,9-FlAn, 2,3-TriP, 1,2-TriP, ace, or indeno substituent or their alkyl or aryl substituted derivative.

85. The organic light-emitting device of claim 1 wherein the first component of the mixture is a benzenoid compound that has the formula:

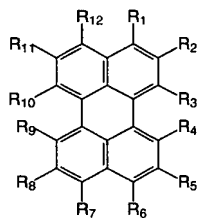


wherein:

substituents R₁ through R₁₀ are each individually hydrogen, fluoro, cyano, alkoxy, aryloxy, diarylamino, arylalkylamino, dialkylamino, trialkylsilyl, triarylsilyl, diarylalkylsilyl, dialkylarylsilyl, keto, dicyanomethyl, alkyl of from 1 to 24 carbon atoms, alkenyl of from 1 to 24 carbon atoms, alkynyl of from 1 to 24 carbon atoms, aryl of from 5 to 30 carbon atoms, substituted aryl, heterocycle containing at least one nitrogen atom, or at least one oxygen atom, or at least one sulfur atom, or at least one boron atom, or at least one phosphorus atom, or at least one silicon atom, or any combination thereof; or any two adjacent R₁ through R₁₀ substituents form an annelated benzo-, naphtho-, anthra-, phenanthro-, fluorantheno-, pyreno-, triphenyleno-, or peryleno- substituent or its alkyl or aryl substituted derivative; or any two R₁ through R₁₀ substituents form a 1,2-benzo, 1,2-naphtho, 2,3-naphtho, 1,8-naphtho, 1,2-anthraceno, 2,3-anthraceno, 2,2'-BP, 4,5-PhAn, 1,12-TriP, 1,12-Per, 9,10-PhAn, 1,9-An, 1,10-PhAn, 2,3-PhAn, 1,2-

PhAn, 1,10-Pyr, 1,2-Pyr, 2,3-Per, 3,4-FlAn, 2,3-FlAn, 1,2-FlAn, 3,4-Per, 7,8-FlAn, 8,9-FlAn, 2,3-TriP, 1,2-TriP, ace, or indeno substituent or their alkyl or aryl substituted derivative.

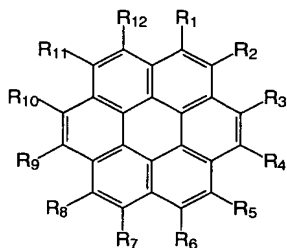
86. The organic light-emitting device of claim 1 wherein the first component of the mixture is a benzenoid compound that has the formula:



wherein:

substituents R₁ through R₁₂ are each individually hydrogen, fluoro, cyano, alkoxy, aryloxy, diarylamino, arylalkylamino, dialkylamino, trialkylsilyl, triarylsilyl, diarylalkylsilyl, dialkylarylsilyl, keto, dicyanomethyl, alkyl of from 1 to 24 carbon atoms, alkenyl of from 1 to 24 carbon atoms, alkynyl of from 1 to 24 carbon atoms, aryl of from 5 to 30 carbon atoms, substituted aryl, heterocycle containing at least one nitrogen atom, or at least one oxygen atom, or at least one sulfur atom, or at least one boron atom, or at least one phosphorus atom, or at least one silicon atom, or any combination thereof; or any two adjacent R₁ through R₁₂ substituents form an annelated benzo-, naphtho-, anthra-, phenanthro-, fluorantheno-, pyreno-, triphenyleno-, or peryleno- substituent or its alkyl or aryl substituted derivative; or any two R₁ through R₁₂ substituents form a 1,2-benzo, 1,2-naphtho, 2,3-naphtho, 1,8-naphtho, 1,2-anthraceno, 2,3-anthraceno, 2,2'-BP, 4,5-PhAn, 1,12-TriP, 1,12-Per, 9,10-PhAn, 1,9-An, 1,10-PhAn, 2,3-PhAn, 1,2-PhAn, 1,10-Pyr, 1,2-Pyr, 2,3-Per, 3,4-FlAn, 2,3-FlAn, 1,2-FlAn, 3,4-Per, 7,8-FlAn, 8,9-FlAn, 2,3-TriP, 1,2-TriP, ace, or indeno substituent or their alkyl or aryl substituted derivative.

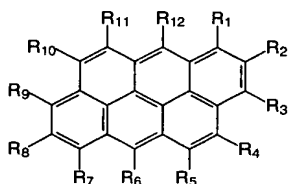
87. The organic light-emitting device of claim 1 wherein the first component of the mixture is a benzenoid compound that has the formula:



wherein:

substituents R₁ through R₁₂ are each individually hydrogen, fluoro, cyano, alkoxy, aryloxy, diarylamino, arylalkylamino, dialkylamino, trialkylsilyl, triarylsilyl, diarylalkylsilyl, dialkylarylsilyl, keto, dicyanomethyl, alkyl of from 1 to 24 carbon atoms, alkenyl of from 1 to 24 carbon atoms, alkynyl of from 1 to 24 carbon atoms, aryl of from 5 to 30 carbon atoms, substituted aryl, heterocycle containing at least one nitrogen atom, or at least one oxygen atom, or at least one sulfur atom, or at least one boron atom, or at least one phosphorus atom, or at least one silicon atom, or any combination thereof; or any two adjacent R₁ through R₁₂ substituents form an annelated benzo-, naphtho-, anthra-, phenanthro-, fluorantheno-, pyreno-, triphenyleno-, or peryleno- substituent or its alkyl or aryl substituted derivative; or any two R₁ through R₁₂ substituents form a 1,2-benzo, 1,2-naphtho, 2,3-naphtho, 1,8-naphtho, 1,2-anthraceno, 2,3-anthraceno, 2,2'-BP, 4,5-PhAn, 1,12-TriP, 1,12-Per, 9,10-PhAn, 1,9-An, 1,10-PhAn, 2,3-PhAn, 1,2-PhAn, 1,10-Pyr, 1,2-Pyr, 2,3-Per, 3,4-FlAn, 2,3-FlAn, 1,2-FlAn, 3,4-Per, 7,8-FlAn, 8,9-FlAn, 2,3-TriP, 1,2-TriP, ace, or indeno substituent or their alkyl or aryl substituted derivative.

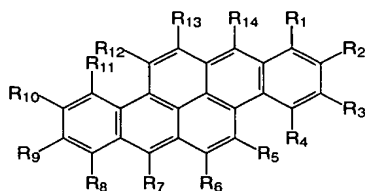
88. The organic light-emitting device of claim 1 wherein the first component of the mixture is a benzenoid compound that has the formula:



wherein:

substituents R_1 through R_{12} are each individually hydrogen, fluoro, cyano, alkoxy, aryloxy, diarylamino, arylalkylamino, dialkylamino, trialkylsilyl, triarylsilyl, diarylalkylsilyl, dialkylarylsilyl, keto, dicyanomethyl, alkyl of from 1 to 24 carbon atoms, alkenyl of from 1 to 24 carbon atoms, alkynyl of from 1 to 24 carbon atoms, aryl of from 5 to 30 carbon atoms, substituted aryl, heterocycle containing at least one nitrogen atom, or at least one oxygen atom, or at least one sulfur atom, or at least one boron atom, or at least one phosphorus atom, or at least one silicon atom, or any combination thereof; or any two adjacent R_1 through R_{12} substituents form an annelated benzo-, naphtho-, anthra-, phenanthro-, fluorantheno-, pyreno-, triphenyleno-, or peryleno- substituent or its alkyl or aryl substituted derivative; or any two R_1 through R_{12} substituents form a 1,2-benzo, 1,2-naphtho, 2,3-naphtho, 1,8-naphtho, 1,2-anthraceno, 2,3-anthraceno, 2,2'-BP, 4,5-PhAn, 1,12-TriP, 1,12-Per, 9,10-PhAn, 1,9-An, 1,10-PhAn, 2,3-PhAn, 1,2-PhAn, 1,10-Pyr, 1,2-Pyr, 2,3-Per, 3,4-FlAn, 2,3-FlAn, 1,2-FlAn, 3,4-Per, 7,8-FlAn, 8,9-FlAn, 2,3-TriP, 1,2-TriP, ace, or indeno substituent or their alkyl or aryl substituted derivative.

89. The organic light-emitting device of claim 1 wherein the first component of the mixture is a benzenoid compound that has the formula:

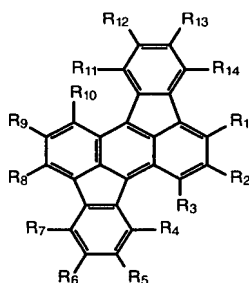


wherein:

substituents R_1 through R_{14} are each individually hydrogen, fluoro, cyano, alkoxy, aryloxy, diarylamino, arylalkylamino, dialkylamino, trialkylsilyl, triarylsilyl, diarylalkylsilyl, dialkylarylsilyl, keto, dicyanomethyl, alkyl of from 1 to 24 carbon atoms, alkenyl of from 1 to 24 carbon atoms, alkynyl of from 1 to 24 carbon atoms, aryl of from 5 to 30 carbon atoms, substituted aryl, heterocycle containing at least one nitrogen atom, or at least one oxygen atom, or at least one

sulfur atom, or at least one boron atom, or at least one phosphorus atom, or at least one silicon atom, or any combination thereof; or any two adjacent R₁ through R₁₄ substituents form an annelated benzo-, naphtho-, anthra-, phenanthro-, fluorantheno-, pyreno-, triphenyleno-, or peryleno- substituent or its alkyl or aryl substituted derivative; or any two R₁ through R₁₄ substituents form a 1,2-benzo, 1,2-naphtho, 2,3-naphtho, 1,8-naphtho, 1,2-anthraceno, 2,3-anthraceno, 2,2'-BP, 4,5-PhAn, 1,12-TriP, 1,12-Per, 9,10-PhAn, 1,9-An, 1,10-PhAn, 2,3-PhAn, 1,2-PhAn, 1,10-Pyr, 1,2-Pyr, 2,3-Per, 3,4-FlAn, 2,3-FlAn, 1,2-FlAn, 3,4-Per, 7,8-FlAn, 8,9-FlAn, 2,3-TriP, 1,2-TriP, ace, or indeno substituent or their alkyl or aryl substituted derivative.

90. The organic light-emitting device of claim 1 wherein the first component of the mixture is a benzenoid compound that has the formula:

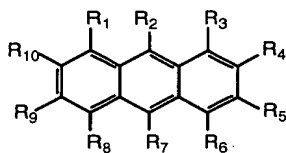


wherein:

substituents R₁ through R₁₄ are each individually hydrogen, fluoro, cyano, alkoxy, aryloxy, diarylamino, arylalkylamino, dialkylamino, trialkylsilyl, triarylsilyl, diarylalkylsilyl, dialkylarylsilyl, keto, dicyanomethyl, alkyl of from 1 to 24 carbon atoms, alkenyl of from 1 to 24 carbon atoms, alkynyl of from 1 to 24 carbon atoms, aryl of from 5 to 30 carbon atoms, substituted aryl, heterocycle containing at least one nitrogen atom, or at least one oxygen atom, or at least one sulfur atom, or at least one boron atom, or at least one phosphorus atom, or at least one silicon atom, or any combination thereof; or any two adjacent R₁ through R₁₄ substituents form an annelated benzo-, naphtho-, anthra-, phenanthro-, fluorantheno-, pyreno-, triphenyleno-, or peryleno- substituent or its alkyl or aryl substituted derivative; or any two R₁ through R₁₄ substituents form a 1,2-benzo,

1,2-naphtho, 2,3-naphtho, 1,8-naphtho, 1,2-anthraceno, 2,3-anthraceno, 2,2'-BP, 4,5-PhAn, 1,12-TriP, 1,12-Per, 9,10-PhAn, 1,9-An, 1,10-PhAn, 2,3-PhAn, 1,2-PhAn, 1,10-Pyr, 1,2-Pyr, 2,3-Per, 3,4-FlAn, 2,3-FlAn, 1,2-FlAn, 3,4-Per, 7,8-FlAn, 8,9-FlAn, 2,3-TriP, 1,2-TriP, ace, or indeno substituent or their alkyl or aryl substituted derivative.

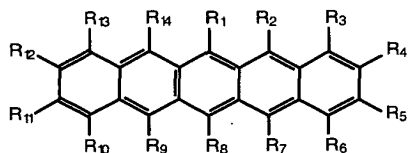
91. The organic light-emitting device of claim 1 wherein the first component of the mixture is a benzenoid compound that has the formula:



wherein:

substituents R₁ through R₁₀ are each individually hydrogen, fluoro, cyano, alkoxy, aryloxy, diarylamino, arylalkylamino, dialkylamino, trialkylsilyl, triarylsilyl, diarylalkylsilyl, dialkylarylsilyl, keto, dicyanomethyl, alkyl of from 1 to 24 carbon atoms, alkenyl of from 1 to 24 carbon atoms, alkynyl of from 1 to 24 carbon atoms, aryl of from 5 to 30 carbon atoms, substituted aryl, heterocycle containing at least one nitrogen atom, or at least one oxygen atom, or at least one sulfur atom, or at least one boron atom, or at least one phosphorus atom, or at least one silicon atom, or any combination thereof; or any two adjacent R₁ through R₁₀ substituents form an annelated benzo-, naphtho-, anthra-, phenanthro-, fluorantheno-, pyreno-, triphenyleno-, or peryleno- substituent or its alkyl or aryl substituted derivative; or any two R₁ through R₁₀ substituents form a 1,2-benzo, 1,2-naphtho, 2,3-naphtho, 1,8-naphtho, 1,2-anthraceno, 2,3-anthraceno, 2,2'-BP, 4,5-PhAn, 1,12-TriP, 1,12-Per, 9,10-PhAn, 1,9-An, 1,10-PhAn, 2,3-PhAn, 1,2-PhAn, 1,10-Pyr, 1,2-Pyr, 2,3-Per, 3,4-FlAn, 2,3-FlAn, 1,2-FlAn, 3,4-Per, 7,8-FlAn, 8,9-FlAn, 2,3-TriP, 1,2-TriP, ace, or indeno substituent or their alkyl or aryl substituted derivative.

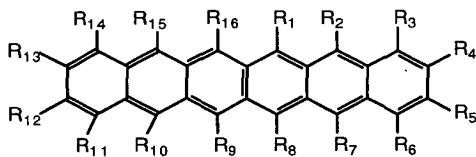
92. The organic light-emitting device of claim 1 wherein the first component of the mixture is a benzenoid compound that has the formula:



wherein:

substituents R₁ through R₁₄ are each individually hydrogen, fluoro, cyano, alkoxy, aryloxy, diarylamino, arylalkylamino, dialkylamino, trialkylsilyl, triarylsilyl, diarylalkylsilyl, dialkylarylsilyl, keto, dicyanomethyl, alkyl of from 1 to 24 carbon atoms, alkenyl of from 1 to 24 carbon atoms, alkynyl of from 1 to 24 carbon atoms, aryl of from 5 to 30 carbon atoms, substituted aryl, heterocycle containing at least one nitrogen atom, or at least one oxygen atom, or at least one sulfur atom, or at least one boron atom, or at least one phosphorus atom, or at least one silicon atom, or any combination thereof; or any two adjacent R₁ through R₁₄ substituents form an annelated benzo-, naphtho-, anthra-, phenanthro-, fluorantheno-, pyreno-, triphenyleno-, or peryleno- substituent or its alkyl or aryl substituted derivative; or any two R₁ through R₁₄ substituents form a 1,2-benzo, 1,2-naphtho, 2,3-naphtho, 1,8-naphtho, 1,2-anthraceno, 2,3-anthraceno, 2,2'-BP, 4,5-PhAn, 1,12-TriP, 1,12-Per, 9,10-PhAn, 1,9-An, 1,10-PhAn, 2,3-PhAn, 1,2-PhAn, 1,10-Pyr, 1,2-Pyr, 2,3-Per, 3,4-FlAn, 2,3-FlAn, 1,2-FlAn, 3,4-Per, 7,8-FlAn, 8,9-FlAn, 2,3-TriP, 1,2-TriP, ace, or indeno substituent or their alkyl or aryl substituted derivative.

93. The organic light-emitting device of claim 1 wherein the first component of the mixture is a benzenoid compound that has the formula:

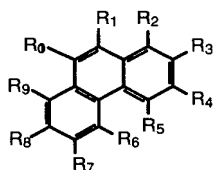


wherein:

substituents R₁ through R₁₆ are each individually hydrogen, fluoro, cyano, alkoxy, aryloxy, diarylamino, arylalkylamino, dialkylamino, trialkylsilyl, triarylsilyl, diarylalkylsilyl, dialkylarylsilyl, keto, dicyanomethyl, alkyl of from 1 to 24 carbon atoms, alkenyl of from 1 to 24 carbon atoms, alkynyl of from 1 to 24

carbon atoms, aryl of from 5 to 30 carbon atoms, substituted aryl, heterocycle containing at least one nitrogen atom, or at least one oxygen atom, or at least one sulfur atom, or at least one boron atom, or at least one phosphorus atom, or at least one silicon atom, or any combination thereof; or any two adjacent R₁ through R₁₆ substituents form an annelated benzo-, naphtho-, anthra-, phenanthro-, fluorantheno-, pyreno-, triphenyleno-, or peryleno- substituent or its alkyl or aryl substituted derivative; or any two R₁ through R₁₆ substituents form a 1,2-benzo, 1,2-naphtho, 2,3-naphtho, 1,8-naphtho, 1,2-anthraceno, 2,3-anthraceno, 2,2'-BP, 4,5-PhAn, 1,12-TriP, 1,12-Per, 9,10-PhAn, 1,9-An, 1,10-PhAn, 2,3-PhAn, 1,2-PhAn, 1,10-Pyr, 1,2-Pyr, 2,3-Per, 3,4-FlAn, 2,3-FlAn, 1,2-FlAn, 3,4-Per, 7,8-FlAn, 8,9-FlAn, 2,3-TriP, 1,2-TriP, ace, or indeno substituent or their alkyl or aryl substituted derivative.

94. The organic light-emitting device of claim 1 wherein the first component of the mixture is a benzenoid compound that has the formula:

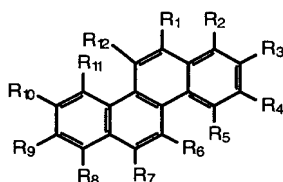


wherein:

substituents R₁ through R₁₀ are each individually hydrogen, fluoro, cyano, alkoxy, aryloxy, diarylamino, arylalkylamino, dialkylamino, trialkylsilyl, triarylsilyl, diarylalkylsilyl, dialkylarylsilyl, keto, dicyanomethyl, alkyl of from 1 to 24 carbon atoms, alkenyl of from 1 to 24 carbon atoms, alkynyl of from 1 to 24 carbon atoms, aryl of from 5 to 30 carbon atoms, substituted aryl, heterocycle containing at least one nitrogen atom, or at least one oxygen atom, or at least one sulfur atom, or at least one boron atom, or at least one phosphorus atom, or at least one silicon atom, or any combination thereof; or any two adjacent R₁ through R₁₀ substituents form an annelated benzo-, naphtho-, anthra-, phenanthro-, fluorantheno-, pyreno-, triphenyleno-, or peryleno- substituent or its alkyl or aryl substituted derivative; or any two R₁ through R₁₀ substituents form a 1,2-benzo,

1,2-naphtho, 2,3-naphtho, 1,8-naphtho, 1,2-anthraceno, 2,3-anthraceno, 2,2'-BP, 4,5-PhAn, 1,12-TriP, 1,12-Per, 9,10-PhAn, 1,9-An, 1,10-PhAn, 2,3-PhAn, 1,2-PhAn, 1,10-Pyr, 1,2-Pyr, 2,3-Per, 3,4-FlAn, 2,3-FlAn, 1,2-FlAn, 3,4-Per, 7,8-FlAn, 8,9-FlAn, 2,3-TriP, 1,2-TriP, ace, or indeno substituent or their alkyl or aryl substituted derivative.

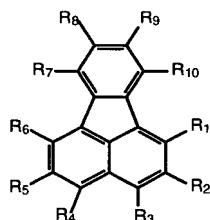
95. The organic light-emitting device of claim 1 wherein the first component of the mixture is a benzenoid compound that has the formula:



wherein:

substituents R₁ through R₁₂ are each individually hydrogen, fluoro, cyano, alkoxy, aryloxy, diarylamino, arylalkylamino, dialkylamino, trialkylsilyl, triarylsilyl, diarylalkylsilyl, dialkylarylsilyl, keto, dicyanomethyl, alkyl of from 1 to 24 carbon atoms, alkenyl of from 1 to 24 carbon atoms, alkynyl of from 1 to 24 carbon atoms, aryl of from 5 to 30 carbon atoms, substituted aryl, heterocycle containing at least one nitrogen atom, or at least one oxygen atom, or at least one sulfur atom, or at least one boron atom, or at least one phosphorus atom, or at least one silicon atom, or any combination thereof; or any two adjacent R₁ through R₁₂ substituents form an annelated benzo-, naphtho-, anthra-, phenanthro-, fluorantheno-, pyreno-, triphenyleno-, or peryleno- substituent or its alkyl or aryl substituted derivative; or any two R₁ through R₁₂ substituents form a 1,2-benzo, 1,2-naphtho, 2,3-naphtho, 1,8-naphtho, 1,2-anthraceno, 2,3-anthraceno, 2,2'-BP, 4,5-PhAn, 1,12-TriP, 1,12-Per, 9,10-PhAn, 1,9-An, 1,10-PhAn, 2,3-PhAn, 1,2-PhAn, 1,10-Pyr, 1,2-Pyr, 2,3-Per, 3,4-FlAn, 2,3-FlAn, 1,2-FlAn, 3,4-Per, 7,8-FlAn, 8,9-FlAn, 2,3-TriP, 1,2-TriP, ace, or indeno substituent or their alkyl or aryl substituted derivative.

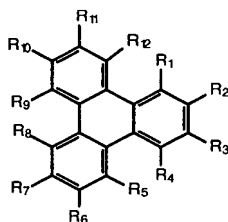
96. The organic light-emitting device of claim 1 wherein the first component of the mixture is a benzenoid compound that has the formula:



wherein:

substituents R₁ through R₁₀ are each individually hydrogen, fluoro, cyano, alkoxy, aryloxy, diarylamino, arylalkylamino, dialkylamino, trialkylsilyl, triarylsilyl, diarylalkylsilyl, dialkylarylsilyl, keto, dicyanomethyl, alkyl of from 1 to 24 carbon atoms, alkenyl of from 1 to 24 carbon atoms, alkynyl of from 1 to 24 carbon atoms, aryl of from 5 to 30 carbon atoms, substituted aryl, heterocycle containing at least one nitrogen atom, or at least one oxygen atom, or at least one sulfur atom, or at least one boron atom, or at least one phosphorus atom, or at least one silicon atom, or any combination thereof; or any two adjacent R₁ through R₁₀ substituents form an annelated benzo-, naphtho-, anthra-, phenanthro-, fluorantheno-, pyreno-, triphenyleno-, or peryleno- substituent or its alkyl or aryl substituted derivative; or any two R₁ through R₁₀ substituents form a 1,2-benzo, 1,2-naphtho, 2,3-naphtho, 1,8-naphtho, 1,2-anthraceno, 2,3-anthraceno, 2,2'-BP, 4,5-PhAn, 1,12-TriP, 1,12-Per, 9,10-PhAn, 1,9-An, 1,10-PhAn, 2,3-PhAn, 1,2-PhAn, 1,10-Pyr, 1,2-Pyr, 2,3-Per, 3,4-FlAn, 2,3-FlAn, 1,2-FlAn, 3,4-Per, 7,8-FlAn, 8,9-FlAn, 2,3-TriP, 1,2-TriP, ace, or indeno substituent or their alkyl or aryl substituted derivative.

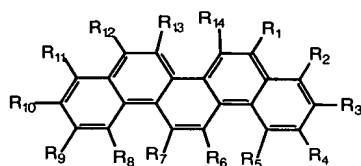
97. The organic light-emitting device of claim 1 wherein the first component of the mixture is a benzenoid compound that has the formula:



wherein:

substituents R_1 through R_{12} are each individually hydrogen, fluoro, cyano, alkoxy, aryloxy, diarylamino, arylalkylamino, dialkylamino, trialkylsilyl, triarylsilyl, diarylalkylsilyl, dialkylarylsilyl, keto, dicyanomethyl, alkyl of from 1 to 24 carbon atoms, alkenyl of from 1 to 24 carbon atoms, alkynyl of from 1 to 24 carbon atoms, aryl of from 5 to 30 carbon atoms, substituted aryl, heterocycle containing at least one nitrogen atom, or at least one oxygen atom, or at least one sulfur atom, or at least one boron atom, or at least one phosphorus atom, or at least one silicon atom, or any combination thereof; or any two adjacent R_1 through R_{12} substituents form an annelated benzo-, naphtho-, anthra-, phenanthro-, fluorantheno-, pyreno-, triphenyleno-, or peryleno- substituent or its alkyl or aryl substituted derivative; or any two R_1 through R_{12} substituents form a 1,2-benzo, 1,2-naphtho, 2,3-naphtho, 1,8-naphtho, 1,2-anthraceno, 2,3-anthraceno, 2,2'-BP, 4,5-PhAn, 1,12-TriP, 1,12-Per, 9,10-PhAn, 1,9-An, 1,10-PhAn, 2,3-PhAn, 1,2-PhAn, 1,10-Pyr, 1,2-Pyr, 2,3-Per, 3,4-FlAn, 2,3-FlAn, 1,2-FlAn, 3,4-Per, 7,8-FlAn, 8,9-FlAn, 2,3-TriP, 1,2-TriP, ace, or indeno substituent or their alkyl or aryl substituted derivative.

98. The organic light-emitting device of claim 1 wherein the first component of the mixture is a benzenoid compound that has the formula:

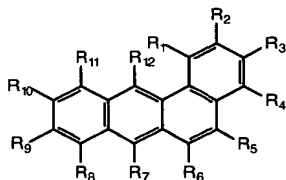


wherein:

substituents R_1 through R_{14} are each individually hydrogen, fluoro, cyano, alkoxy, aryloxy, diarylamino, arylalkylamino, dialkylamino, trialkylsilyl, triarylsilyl, diarylalkylsilyl, dialkylarylsilyl, keto, dicyanomethyl, alkyl of from 1 to 24 carbon atoms, alkenyl of from 1 to 24 carbon atoms, alkynyl of from 1 to 24 carbon atoms, aryl of from 5 to 30 carbon atoms, substituted aryl, heterocycle containing at least one nitrogen atom, or at least one oxygen atom, or at least one sulfur atom, or at least one boron atom, or at least one phosphorus atom, or at least

one silicon atom, or any combination thereof; or any two adjacent R_1 through R_{14} substituents form an annelated benzo-, naphtho-, anthra-, phenanthro-, fluorantheno-, pyreno-, triphenyleno-, or peryleno- substituent or its alkyl or aryl substituted derivative; or any two R_1 through R_{14} substituents form a 1,2-benzo, 1,2-naphtho, 2,3-naphtho, 1,8-naphtho, 1,2-anthraceno, 2,3-anthraceno, 2,2'-BP, 4,5-PhAn, 1,12-TriP, 1,12-Per, 9,10-PhAn, 1,9-An, 1,10-PhAn, 2,3-PhAn, 1,2-PhAn, 1,10-Pyr, 1,2-Pyr, 2,3-Per, 3,4-FlAn, 2,3-FlAn, 1,2-FlAn, 3,4-Per, 7,8-FlAn, 8,9-FlAn, 2,3-TriP, 1,2-TriP, ace, or indeno substituent or their alkyl or aryl substituted derivative.

99. The organic light-emitting device of claim 1 wherein the first component of the mixture is a benzenoid compound that has the formula:

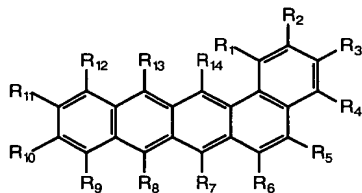


wherein:

substituents R_1 through R_{12} are each individually hydrogen, fluoro, cyano, alkoxy, aryloxy, diarylamino, arylalkylamino, dialkylamino, trialkylsilyl, triarylsilyl, diarylalkylsilyl, dialkylarylsilyl, keto, dicyanomethyl, alkyl of from 1 to 24 carbon atoms, alkenyl of from 1 to 24 carbon atoms, alkynyl of from 1 to 24 carbon atoms, aryl of from 5 to 30 carbon atoms, substituted aryl, heterocycle containing at least one nitrogen atom, or at least one oxygen atom, or at least one sulfur atom, or at least one boron atom, or at least one phosphorus atom, or at least one silicon atom, or any combination thereof; or any two adjacent R_1 through R_{12} substituents form an annelated benzo-, naphtho-, anthra-, phenanthro-, fluorantheno-, pyreno-, triphenyleno-, or peryleno- substituent or its alkyl or aryl substituted derivative; or any two R_1 through R_{12} substituents form a 1,2-benzo, 1,2-naphtho, 2,3-naphtho, 1,8-naphtho, 1,2-anthraceno, 2,3-anthraceno, 2,2'-BP, 4,5-PhAn, 1,12-TriP, 1,12-Per, 9,10-PhAn, 1,9-An, 1,10-PhAn, 2,3-PhAn, 1,2-PhAn, 1,10-Pyr, 1,2-Pyr, 2,3-Per, 3,4-FlAn, 2,3-FlAn, 1,2-FlAn, 3,4-Per, 7,8-

FlAn, 8,9-FlAn, 2,3-TriP, 1,2-TriP, ace, or indeno substituent or their alkyl or aryl substituted derivative.

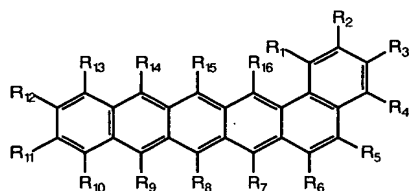
100. The organic light-emitting device of claim 1 wherein the first component of the mixture is a benzenoid compound that has the formula:



wherein:

substituents R₁ through R₁₄ are each individually hydrogen, fluoro, cyano, alkoxy, aryloxy, diarylamino, arylalkylamino, dialkylamino, trialkylsilyl, triarylsilyl, diarylalkylsilyl, dialkylarylsilyl, keto, dicyanomethyl, alkyl of from 1 to 24 carbon atoms, alkenyl of from 1 to 24 carbon atoms, alkynyl of from 1 to 24 carbon atoms, aryl of from 5 to 30 carbon atoms, substituted aryl, heterocycle containing at least one nitrogen atom, or at least one oxygen atom, or at least one sulfur atom, or at least one boron atom, or at least one phosphorus atom, or at least one silicon atom, or any combination thereof; or any two adjacent R₁ through R₁₄ substituents form an annelated benzo-, naphtho-, anthra-, phenanthro-, fluorantheno-, pyreno-, triphenyleno-, or peryleno- substituent or its alkyl or aryl substituted derivative; or any two R₁ through R₁₄ substituents form a 1,2-benzo, 1,2-naphtho, 2,3-naphtho, 1,8-naphtho, 1,2-anthraceno, 2,3-anthraceno, 2,2'-BP, 4,5-PhAn, 1,12-TriP, 1,12-Per, 9,10-PhAn, 1,9-An, 1,10-PhAn, 2,3-PhAn, 1,2-PhAn, 1,10-Pyr, 1,2-Pyr, 2,3-Per, 3,4-FlAn, 2,3-FlAn, 1,2-FlAn, 3,4-Per, 7,8-FlAn, 8,9-FlAn, 2,3-TriP, 1,2-TriP, ace, or indeno substituent or their alkyl or aryl substituted derivative.

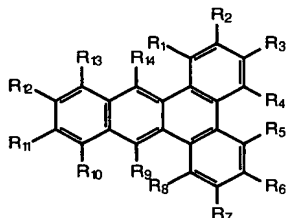
101. The organic light-emitting device of claim 1 wherein the first component of the mixture is a benzenoid compound that has the formula:



wherein:

substituents R₁ through R₁₆ are each individually hydrogen, fluoro, cyano, alkoxy, aryloxy, diarylamino, arylalkylamino, dialkylamino, trialkylsilyl, triarylsilyl, diarylalkylsilyl, dialkylarylsilyl, keto, dicyanomethyl, alkyl of from 1 to 24 carbon atoms, alkenyl of from 1 to 24 carbon atoms, alkynyl of from 1 to 24 carbon atoms, aryl of from 5 to 30 carbon atoms, substituted aryl, heterocycle containing at least one nitrogen atom, or at least one oxygen atom, or at least one sulfur atom, or at least one boron atom, or at least one phosphorus atom, or at least one silicon atom, or any combination thereof; or any two adjacent R₁ through R₁₆ substituents form an annelated benzo-, naphtho-, anthra-, phenanthro-, fluorantheno-, pyreno-, triphenyleno-, or peryleno- substituent or its alkyl or aryl substituted derivative; or any two R₁ through R₁₆ substituents form a 1,2-benzo, 1,2-naphtho, 2,3-naphtho, 1,8-naphtho, 1,2-anthraceno, 2,3-anthraceno, 2,2'-BP, 4,5-PhAn, 1,12-TriP, 1,12-Per, 9,10-PhAn, 1,9-An, 1,10-PhAn, 2,3-PhAn, 1,2-PhAn, 1,10-Pyr, 1,2-Pyr, 2,3-Per, 3,4-FlAn, 2,3-FlAn, 1,2-FlAn, 3,4-Per, 7,8-FlAn, 8,9-FlAn, 2,3-TriP, 1,2-TriP, ace, or indeno substituent or their alkyl or aryl substituted derivative.

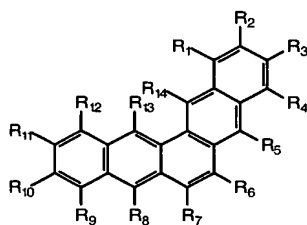
102. The organic light-emitting device of claim 1 wherein the first component of the mixture is a benzenoid compound that has the formula:



wherein:

substituents R_1 through R_{14} are each individually hydrogen, fluoro, cyano, alkoxy, aryloxy, diarylamino, arylalkylamino, dialkylamino, trialkylsilyl, triarylsilyl, diarylalkylsilyl, dialkylarylsilyl, keto, dicyanomethyl, alkyl of from 1 to 24 carbon atoms, alkenyl of from 1 to 24 carbon atoms, alkynyl of from 1 to 24 carbon atoms, aryl of from 5 to 30 carbon atoms, substituted aryl, heterocycle containing at least one nitrogen atom, or at least one oxygen atom, or at least one sulfur atom, or at least one boron atom, or at least one phosphorus atom, or at least one silicon atom, or any combination thereof; or any two adjacent R_1 through R_{14} substituents form an annelated benzo-, naphtho-, anthra-, phenanthro-, fluorantheno-, pyreno-, triphenyleno-, or peryleno- substituent or its alkyl or aryl substituted derivative; or any two R_1 through R_{14} substituents form a 1,2-benzo, 1,2-naphtho, 2,3-naphtho, 1,8-naphtho, 1,2-anthraceno, 2,3-anthraceno, 2,2'-BP, 4,5-PhAn, 1,12-TriP, 1,12-Per, 9,10-PhAn, 1,9-An, 1,10-PhAn, 2,3-PhAn, 1,2-PhAn, 1,10-Pyr, 1,2-Pyr, 2,3-Per, 3,4-FlAn, 2,3-FlAn, 1,2-FlAn, 3,4-Per, 7,8-FlAn, 8,9-FlAn, 2,3-TriP, 1,2-TriP, ace, or indeno substituent or their alkyl or aryl substituted derivative.

103. The organic light-emitting device of claim 1 wherein the first component of the mixture is a benzenoid compound that has the formula:

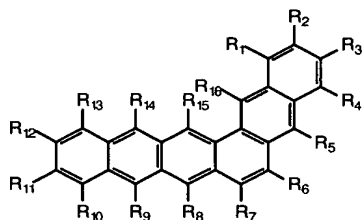


wherein:

substituents R_1 through R_{14} are each individually hydrogen, fluoro, cyano, alkoxy, aryloxy, diarylamino, arylalkylamino, dialkylamino, trialkylsilyl, triarylsilyl, diarylalkylsilyl, dialkylarylsilyl, keto, dicyanomethyl, alkyl of from 1 to 24 carbon atoms, alkenyl of from 1 to 24 carbon atoms, alkynyl of from 1 to 24 carbon atoms, aryl of from 5 to 30 carbon atoms, substituted aryl, heterocycle

containing at least one nitrogen atom, or at least one oxygen atom, or at least one sulfur atom, or at least one boron atom, or at least one phosphorus atom, or at least one silicon atom, or any combination thereof; or any two adjacent R₁ through R₁₄ substituents form an annelated benzo-, naphtho-, anthra-, phenanthro-, fluorantheno-, pyreno-, triphenyleno-, or peryleno- substituent or its alkyl or aryl substituted derivative; or any two R₁ through R₁₄ substituents form a 1,2-benzo, 1,2-naphtho, 2,3-naphtho, 1,8-naphtho, 1,2-anthraceno, 2,3-anthraceno, 2,2'-BP, 4,5-PhAn, 1,12-TriP, 1,12-Per, 9,10-PhAn, 1,9-An, 1,10-PhAn, 2,3-PhAn, 1,2-PhAn, 1,10-Pyr, 1,2-Pyr, 2,3-Per, 3,4-FlAn, 2,3-FlAn, 1,2-FlAn, 3,4-Per, 7,8-FlAn, 8,9-FlAn, 2,3-TriP, 1,2-TriP, ace, or indeno substituent or their alkyl or aryl substituted derivative.

104. The organic light-emitting device of claim 1 wherein the first component of the mixture is a benzenoid compound that has the formula:

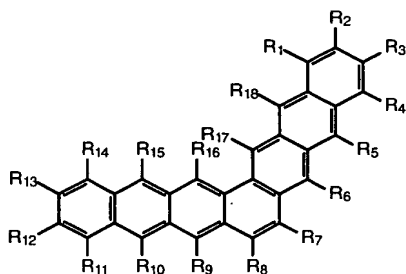


wherein:

substituents R₁ through R₁₆ are each individually hydrogen, fluoro, cyano, alkoxy, aryloxy, diarylamino, arylalkylamino, dialkylamino, trialkylsilyl, triarylsilyl, diarylalkylsilyl, dialkylarylsilyl, keto, dicyanomethyl, alkyl of from 1 to 24 carbon atoms, alkenyl of from 1 to 24 carbon atoms, alkynyl of from 1 to 24 carbon atoms, aryl of from 5 to 30 carbon atoms, substituted aryl, heterocycle containing at least one nitrogen atom, or at least one oxygen atom, or at least one sulfur atom, or at least one boron atom, or at least one phosphorus atom, or at least one silicon atom, or any combination thereof; or any two adjacent R₁ through R₁₆ substituents form an annelated benzo-, naphtho-, anthra-, phenanthro-, fluorantheno-, pyreno-, triphenyleno-, or peryleno- substituent or its alkyl or aryl substituted derivative; or any two R₁ through R₁₆ substituents form a 1,2-benzo,

1,2-naphtho, 2,3-naphtho, 1,8-naphtho, 1,2-anthraceno, 2,3-anthraceno, 2,2'-BP, 4,5-PhAn, 1,12-TriP, 1,12-Per, 9,10-PhAn, 1,9-An, 1,10-PhAn, 2,3-PhAn, 1,2-PhAn, 1,10-Pyr, 1,2-Pyr, 2,3-Per, 3,4-FlAn, 2,3-FlAn, 1,2-FlAn, 3,4-Per, 7,8-FlAn, 8,9-FlAn, 2,3-TriP, 1,2-TriP, ace, or indeno substituent or their alkyl or aryl substituted derivative.

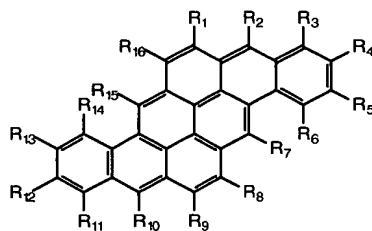
105. The organic light-emitting device of claim 1 wherein the first component of the mixture is a benzenoid compound that has the formula:



wherein:

substituents R₁ through R₁₈ are each individually hydrogen, fluoro, cyano, alkoxy, aryloxy, diarylamino, arylalkylamino, dialkylamino, trialkylsilyl, triarylsilyl, diarylalkylsilyl, dialkylarylsilyl, keto, dicyanomethyl, alkyl of from 1 to 24 carbon atoms, alkenyl of from 1 to 24 carbon atoms, alkynyl of from 1 to 24 carbon atoms, aryl of from 5 to 30 carbon atoms, substituted aryl, heterocycle containing at least one nitrogen atom, or at least one oxygen atom, or at least one sulfur atom, or at least one boron atom, or at least one phosphorus atom, or at least one silicon atom, or any combination thereof; or any two adjacent R₁ through R₁₈ substituents form an annelated benzo-, naphtho-, anthra-, phenanthro-, fluorantheno-, pyreno-, triphenyleno-, or peryleno- substituent or its alkyl or aryl substituted derivative; or any two R₁ through R₁₈ substituents form a 1,2-benzo, 1,2-naphtho, 2,3-naphtho, 1,8-naphtho, 1,2-anthraceno, 2,3-anthraceno, 2,2'-BP, 4,5-PhAn, 1,12-TriP, 1,12-Per, 9,10-PhAn, 1,9-An, 1,10-PhAn, 2,3-PhAn, 1,2-PhAn, 1,10-Pyr, 1,2-Pyr, 2,3-Per, 3,4-FlAn, 2,3-FlAn, 1,2-FlAn, 3,4-Per, 7,8-FlAn, 8,9-FlAn, 2,3-TriP, 1,2-TriP, ace, or indeno substituent or their alkyl or aryl substituted derivative.

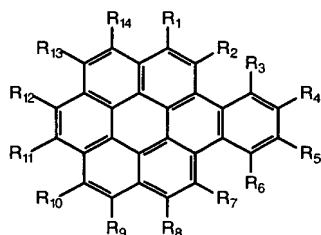
106. The organic light-emitting device of claim 1 wherein the first component of the mixture is a benzenoid compound that has the formula:



wherein:

substituents R₁ through R₁₆ are each individually hydrogen, fluoro, cyano, alkoxy, aryloxy, diarylamino, arylalkylamino, dialkylamino, trialkylsilyl, triarylsilyl, diarylalkylsilyl, dialkylarylsilyl, keto, dicyanomethyl, alkyl of from 1 to 24 carbon atoms, alkenyl of from 1 to 24 carbon atoms, alkynyl of from 1 to 24 carbon atoms, aryl of from 5 to 30 carbon atoms, substituted aryl, heterocycle containing at least one nitrogen atom, or at least one oxygen atom, or at least one sulfur atom, or at least one boron atom, or at least one phosphorus atom, or at least one silicon atom, or any combination thereof; or any two adjacent R₁ through R₁₆ substituents form an annelated benzo-, naphtho-, anthra-, phenanthro-, fluorantheno-, pyreno-, triphenyleno-, or peryleno- substituent or its alkyl or aryl substituted derivative; or any two R₁ through R₁₆ substituents form a 1,2-benzo, 1,2-naphtho, 2,3-naphtho, 1,8-naphtho, 1,2-anthraceno, 2,3-anthraceno, 2,2'-BP, 4,5-PhAn, 1,12-TriP, 1,12-Per, 9,10-PhAn, 1,9-An, 1,10-PhAn, 2,3-PhAn, 1,2-PhAn, 1,10-Pyr, 1,2-Pyr, 2,3-Per, 3,4-FlAn, 2,3-FlAn, 1,2-FlAn, 3,4-Per, 7,8-FlAn, 8,9-FlAn, 2,3-TriP, 1,2-TriP, ace, or indeno substituent or their alkyl or aryl substituted derivative.

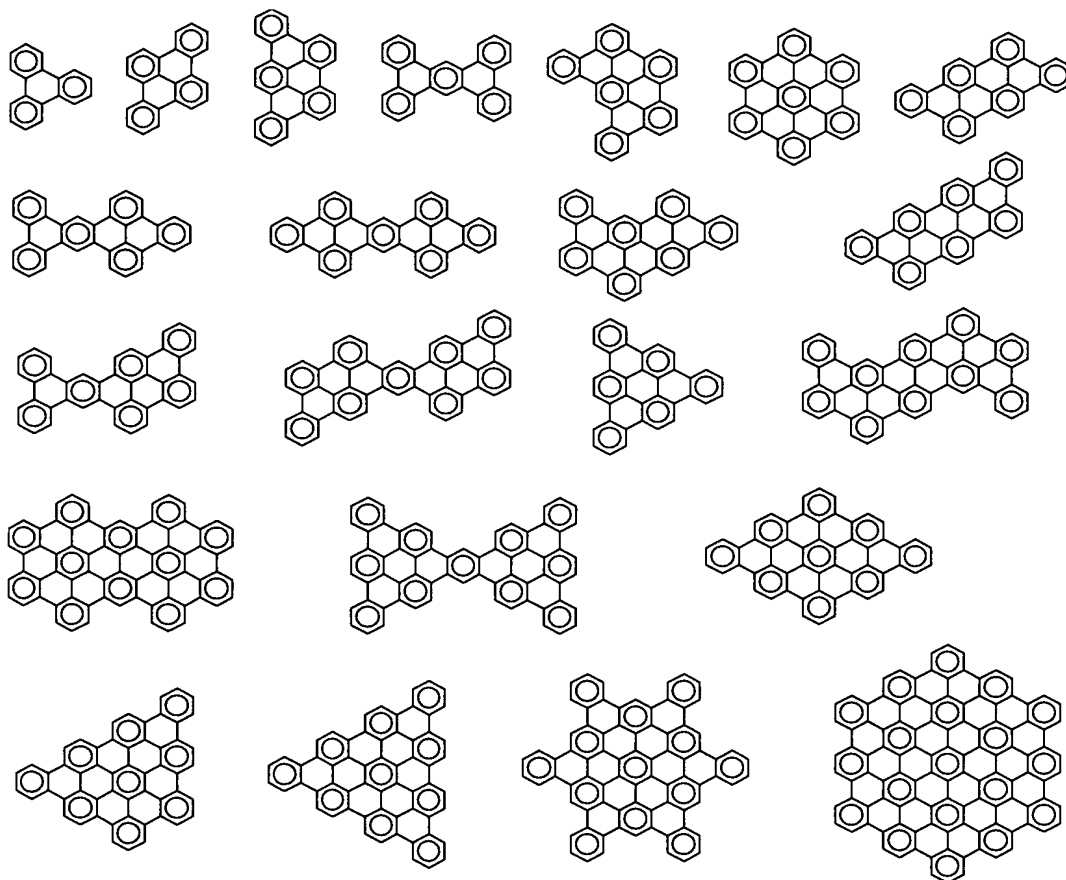
107. The organic light-emitting device of claim 1 wherein the first component of the mixture is a benzenoid compound that has the formula:



wherein:

substituents R₁ through R₁₄ are each individually hydrogen, fluoro, cyano, alkoxy, aryloxy, diarylamino, arylalkylamino, dialkylamino, trialkylsilyl, triarylsilyl, diarylalkylsilyl, dialkylarylsilyl, keto, dicyanomethyl, alkyl of from 1 to 24 carbon atoms, alkenyl of from 1 to 24 carbon atoms, alkynyl of from 1 to 24 carbon atoms, aryl of from 5 to 30 carbon atoms, substituted aryl, heterocycle containing at least one nitrogen atom, or at least one oxygen atom, or at least one sulfur atom, or at least one boron atom, or at least one phosphorus atom, or at least one silicon atom, or any combination thereof; or any two adjacent R₁ through R₁₄ substituents form an annelated benzo-, naphtho-, anthra-, phenanthro-, fluorantheno-, pyreno-, triphenyleno-, or peryleno- substituent or its alkyl or aryl substituted derivative; or any two R₁ through R₁₄ substituents form a 1,2-benzo, 1,2-naphtho, 2,3-naphtho, 1,8-naphtho, 1,2-anthraceno, 2,3-anthraceno, 2,2'-BP, 4,5-PhAn, 1,12-TriP, 1,12-Per, 9,10-PhAn, 1,9-An, 1,10-PhAn, 2,3-PhAn, 1,2-PhAn, 1,10-Pyr, 1,2-Pyr, 2,3-Per, 3,4-FlAn, 2,3-FlAn, 1,2-FlAn, 3,4-Per, 7,8-FlAn, 8,9-FlAn, 2,3-TriP, 1,2-TriP, ace, or indeno substituent or their alkyl or aryl substituted derivative.

108. The organic light-emitting device of claim 1 wherein the first component of the mixture is a benzenoid compound that has the formula that can be drawn using only fully aromatic benzene rings so as to form graphite-like segments:



wherein:

substituents in each position for each compound and analogous compounds of the homological series are each individually hydrogen, fluoro, cyano, alkoxy, aryloxy, diarylamino, arylalkylamino, dialkylamino, trialkylsilyl, triarylsilyl, diarylalkylsilyl, dialkylarylsilyl, keto, dicyanomethyl, alkyl of from 1 to 24 carbon atoms, alkenyl of from 1 to 24 carbon atoms, alkynyl of from 1 to 24 carbon atoms, aryl of from 5 to 30 carbon atoms, substituted aryl, heterocycle containing at least one nitrogen atom, or at least one oxygen atom, or at least one sulfur atom, or at least one boron atom, or at least one phosphorus atom, or at least one silicon atom, or any combination thereof; or any two adjacent substituents form an annelated benzo-, naphtho-, anthra-, phenanthro-, fluorantheno-, pyreno-, triphenyleno-, or peryleno- substituent or its alkyl or aryl substituted derivative; or any two substituents form a 1,2-benzo, 1,2-naphtho, 2,3-naphtho, 1,8-naphtho,

1,2-anthraceno, 2,3-anthraceno, 2,2'-BP, 4,5-PhAn, 1,12-TriP, 1,12-Per, 9,10-PhAn, 1,9-An, 1,10-PhAn, 2,3-PhAn, 1,2-PhAn, 1,10-Pyr, 1,2-Pyr, 2,3-Per, 3,4-FlAn, 2,3-FlAn, 1,2-FlAn, 3,4-Per, 7,8-FlAn, 8,9-FlAn, 2,3-TriP, 1,2-TriP, ace, or indeno substituent or their alkyl or aryl substituted derivative.

109. The organic light-emitting device of claim 1 wherein the first component of the mixture is a benzenoid compound that is any of the compounds 2 through 1315.

110. An organic light-emitting device comprises a substrate, an anode and a cathode disposed over the substrate, and a luminescent layer disposed between the anode and the cathode wherein the luminescent layer includes a host and at least one dopant, the host of the luminescent layer is selected to include a solid organic material comprising a mixture of at least two components, one of which is capable of forming both monomer state and an aggregate state.